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EXAMINER

PATEL, DHARTI HARIDAS

ART UNIT PAPER NUMBER

2836

DATE MAILED: 06/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/725,852

Applicant(s)

WU ET AL.

Examiner

Dharti H. Patel

Art Unit

2836

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claim 23 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,682,993. Although the conflicting claims are not identical, they are not patentably distinct from each other. Claim 23 of the application is recited in patented claim 1. Claim 23 of the application is broader in scope than claim 1 of the patent in that claim 23 does not recite that the ESD protection discharging means further comprises a resistor with a value between 1,000 and 100,000 ohms. However, applicant's acknowledged prior art [Fig. 1A] teaches that the

ESD protection discharging means comprises a resistor [Fig. 1A, R]. However, it would have been obvious to those skilled in the art at the time the invention was made to provide a protection circuit without a resistor with a value between 1K and 100 K ohms as claimed to provide a simpler circuit which does not require the same level of ESD protection. The product claims recite structure of the device used in the method claims and are obvious in view of the method claims.

3. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

4. Claim 24/23 is rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 6,682,993. This is a double patenting rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over acknowledged prior art, in view of Chen et al., Patent No. 6,858,900. With

respect to claim 1, applicant's prior art [Fig. 1A] teaches a protection circuit for protecting integrated semiconductor active devices from damage due to ESD voltages appearing on the circuit power bus lines said circuit comprising at least one switching circuit string [Fig. 1A, 6] composed of a first [Fig. 1A, NU1] and second [Fig. 1A, NU2] NMOS device and a PMOS device [Fig. 1A, PU1], wherein the gate of said first NMOS device [Fig. 1A, NU1] is connected to a first voltage source [Fig. 1A, Vcc] and the drain element of said first NMOS device [Fig. 1A, NU1] is connected to said active devices input/output signal pad [Fig. 1A, 8] and to the drain element said PMOS device [Fig. 1A, PU1], and the source of said first NMOS device [Fig. 1A, NU1] is connected to the drain element of said second NMOS device [Fig. 1A, NU2] and the gates of said second NMOS [Fig. 1A, NU2] and said PMOS [Fig. 1A, PU1] are connected to an internal circuit [Fig. 1A, 4] and the source of said second NMOS [Fig. 1A, NU2] is connected to a second voltage source [Fig. 1A, Vss], and the source of said PMOS [Fig. 1A, PU1] is connected to a first voltage source [Fig. 1A, Vcc]; and a protection discharging means [Fig. 1A, 7, discharging NMOS device] for discharging ESD energy appearing between said first [Fig. 1A, Vcc] and said second [Fig. 1A, Vss] voltage source, and the drain of said discharging NMOS device is directly connected to said first voltage source [Fig. 1A, Vcc], and the source of said discharging NMOS device is directly connected to said second voltage source [Fig. 1A, Vss]. However, the prior art fails to teach or suggest a protection

discharging means comprising a discharging NMOS device with a first and a second drain diffusion which extends under and around said first drain diffusion.

Chen et al. teaches electrostatic discharge protection devices that have islands and breakdown-enhanced layers. Chen et al. teaches a NMOS structure having a drain diffusion region 14b with a first drain diffusion n+ and a second drain diffusion p 40 which extends under and around said first drain diffusion n+ as disclosed in Col. 5, lines 41-44, lines 48-49, lines 54-58 and Fig. 5.

Both teachings are analogous electrostatic discharge protection circuits for protecting semiconductor devices in an integrated circuit. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Chen et al., which teaches a first and a special second drain diffusion, into the protection circuit of the applicant's acknowledged prior art because p+ pocket implantation have extra function of reducing the breakdown voltage and create junction breakdown much earlier during an ESD event.

With respect to claim 2, applicant's acknowledged prior art teaches that the protection discharging means [Fig. 1A, 7] further comprises a resistor [Fig. 1A, R].

With respect to claim 4, applicant's acknowledged prior art teaches that the gate of said discharging NMOS device is connected to the first end of said resistor and the second end of said resistor is connected to said second voltage source [Fig. 1A, Vss].

With respect to claim 5, Chen et al. teaches a NMOS transistor having a drain wherein first drain diffusion is a n+ donor diffusion to form a normal NMOS drain region [Col. 5, lines 48-49 and Fig. 5].

With respect to claim 6, Chen et al. teaches a NMOS transistor having a drain wherein said special second drain diffusion [Fig. 5, 40, p] is of opposite dopent than said first drain diffusion [Fig. 5, n+] as disclosed in Col. 5, lines 41-44, 48-49 and Fig. 5.

With regard to the limitation of a resistor value between 1 and 100 K ohms in claim 7, a resistance value between 1 and 100 K ohms is very common in the art. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 8, applicant's prior art teaches that the switching circuit string 6 provides a driving current to the output pad [Fig. 1A, 8].

With respect to claim 9, applicant's prior art teaches that the driving current is determined by the total number of the switching strings as disclosed in Fig. 1A. With regard to the limitation of current between 2 and 48 ma, this range does not differ from conventional practice in the art of solid state device fabrication. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or

workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With regard to the limitation of voltage source between 2.5 and 5 volts in claim 10, a voltage source between 2.5 and 5 is the standard across the electronics industry. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 11, applicant's prior art teaches that the second voltage source [Fig. 1A, Vss].

With respect to claim 12, applicant's prior art [Fig. 1B] teaches an effective Vcc to Vss power ESD protection device between Vcc and Vss power bus lines that comprises a silicon substrate 10 having a first dopent type; isolation regions 12 within said substrate for isolation of said ESD protection device; a FET gate 16 with abutting spacers 18 for the ESD protection device; multiple regions of a second dopent type 22 of opposite dopent to the substrate 10 for the ESD protection device between the gate 16 and the field oxide regions 12; multiple regions of a third dopent type of opposite dopent to said substrate for said ESD protection device between said gate 16 and said isolation regions 12; a protective insulation layer 20 over the ESD protection device; and first 16, second 22, and third 24 electrical conductor elements. However, the prior art

fails to teach or suggest a special fourth dopent region of similar dopent to said substrate beneath one said second and third dopent region.

Chen et al. teaches electrostatic discharge protection devices that have islands and breakdown-enhanced layers. Chen et al. teaches a NMOS structure having a special fourth dopent region [Fig. 5, 40] of similar dopent to said substrate [Fig. 5, P-sub 30] beneath one said second and third dopent region [Fig. 5, n+].

Both teachings are analogous electrostatic discharge protection circuits for protecting semiconductor devices in an integrated circuit. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Chen et al., which teaches a first and a special second drain diffusion, into the protection circuit of the applicant's acknowledged prior art because p+ pocket implantation have extra function of reducing the breakdown voltage and create junction breakdown much earlier during an ESD event.

With regard to the limitation of dopent concentration in claims 13 and 17-19, the concentrations do not differ from conventional practice in the art of solid state device fabrication. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With respect to the limitation of gate oxide insulator thickness in claims 14 and 15, the thickness does not differ from conventional practice in the art of solid

state device fabrication. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 16, applicant's prior art teaches that the FET gate abutting spacers 18 are of silicon oxide as disclosed in the Specification, Page 2, line 18 and Fig. 1B.

With respect to claim 20, applicant's prior art teaches that the drain electrical conductor element is connected to a first voltage source V_{cc} , and the source electrical conductor element is connected to a second voltage source V_{ss} as disclosed in Fig. 1A.

With respect to claim 21, applicant's prior art teaches that the gate electrical conductor element is connected to the first end of a diffused resistor as disclosed in Fig. 1A. With regard to the limitation of a resistor value between 1000 and 100 K ohms, a resistance value between 1000 and 100 K ohms is very common in the art. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 22, applicant's prior art teaches that the second end of the resistor is connected to the second voltage source V_{ss} or ground as disclosed in Fig. 1A.

With respect to claim 23, the acknowledged prior art [Fig. 1A] teaches a method of forming a protection circuit for protecting integrated semiconductor active devices from damage due to ESD voltages appearing on the circuit power bus lines said method comprising connecting source region of a used PMOS device [Fig. 1A, PU1] and the source and gate of an unused PMOS device [Fig. 1A, PD1] to a first voltage source [Fig. 1A, Vcc]; connecting the drains of said used [Fig. 1A, PU1] and unused [Fig. 1A, PD1] PMOS devices to said active devices input/output pad [Fig. 1A, 8]; connecting the drain of said used PMOS device [Fig. 1A, PU1] to a drain of a first used NMOS device [Fig. 1A, NU1], and the drain of said unused PMOS device [Fig. 1A, PD1] to a drain of a first unused NMOS device [Fig. 1A, ND1]; connecting the gate of said used PMOS device [Fig. 1A, PU1] and the gate of a second used NMOS device [Fig. 1A, NU2] to separate logic signal lines; connecting the gates of said first used [Fig. 1A, NU1] and said first unused ND1 NMOS devices to said first voltage source [Fig. 1A, Vcc]; connecting the source of said first used NMOS device [Fig. 1A, NU1] to the drain of said second used NMOS device [Fig. 1A, NU2] and connecting source of said first unused NMOS device [Fig. 1A, ND1] to the drain of a second unused NMOS device [Fig. 1A, ND2]; connecting the source of said second used NMOS device [Fig. 1A, NU2] and the source and gate of said second unused NMOS device [Fig. 1A, ND2] to a second voltage source [Fig. 1A, Vss]; and connecting said ESD protection discharging means [Fig. 1A, 7] for discharging ESD energy appearing between and further directly connected to said first [Fig. 1A, Vcc] and

second [Fig. 1A, Vss] voltage source. However, the prior art does not disclose that the ESD protection discharging means comprises a discharging NMOS device with a special diffusion region under and around said device normal drain region.

Chen et al. teaches electrostatic discharge protection devices that have islands and breakdown-enhanced layers. Chen et al. teaches a NMOS structure having a drain diffusion region 14b with a first drain diffusion n⁺ and a second drain diffusion p⁺ 40 which extends under and around said first drain diffusion n⁺ as disclosed in Col. 5, lines 41-44, lines 48-49, lines 54-58 and Fig. 5.

Both teachings are analogous electrostatic discharge protection circuits for protecting semiconductor devices in an integrated circuit. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Chen et al., which teaches a first and a special second drain diffusion, into the protection circuit of the applicant's acknowledged prior art because p⁺ pocket implantation have extra function of reducing the breakdown voltage and create junction breakdown much earlier during an ESD event.

With respect to claim 24, applicant's prior art teaches that the ESD protection discharging means comprises a resistor [Fig. 1A, R]. With regard to the limitation of a resistor value between 1 and 100 K ohms in claim 24, a resistance value between 1 and 100 K ohms is very common in the art. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable

ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). However, the prior art fails to teach or suggest that the special diffusion region is of opposite dopant than said normal drain region.

Chen et al. teaches electrostatic discharge protection devices that have islands and breakdown-enhanced layers. Chen et al. teaches a NMOS structure having a drain diffusion region 14b with a first drain diffusion n+ and a special second drain diffusion p 40 as disclosed in Col. 5, lines 41-44, lines 48-49 and Fig. 5.

Both teachings are analogous electrostatic discharge protection circuits for protecting semiconductor devices in an integrated circuit. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Chen et al., which teaches a first and a special second drain diffusion, into the protection circuit of the applicant's acknowledged prior art because p+ pocket implantation have extra function of reducing the breakdown voltage and create junction breakdown much earlier during an ESD event.

With respect to claim 25, applicant's prior art teaches that ESD protection discharging means is connected to the circuits to be protected by connecting said drain of said discharging NMOS device to said first voltage source [Fig. 1A, Vcc] and connecting the source of said discharging NMOS to said second voltage source [Fig. 1A, Vss].

With respect to claim 26, applicant's prior art teaches that ESD protection discharging means [Fig. 1A, Transistor] is connected to the circuits to be

protected by connecting the gate of said discharging NMOS device to the first end of said resistor [Fig. 1A, R] and connecting the second end of said resistor [Fig. 1A, R] to said second voltage source [Fig. 1A, Vss].

With regard to the limitation of boron with a dosage between $1\text{E}13$ and $1\text{E}14$ a/cm² and dopant concentration between $1\text{E}16$ and $1\text{E}19$ a/cm² in claim 27, the concentrations do not differ from conventional practice in the art of solid state device fabrication. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With regard to the limitation of voltage source between 2.5 and 5 volts in claim 28, the voltage source does not differ from conventional practice in the art of solid-state device fabrication. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experiment. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 29, applicant's prior art teaches that the second voltage source designated Vss [Fig. 1A, Vss] is connected to a voltage level below Vcc, typically ground Fig. 1A].

With respect to claim 30, applicant's prior art teaches that the separate logic signal lines are connected to internal logic devices [Fig. 1A].

Response to Arguments

6. With regard to the arguments about double patenting rejections on page 9, a double patenting rejection is still valid with regard to claims 23 and 24, since they are the exact duplicates of claim 1 of Patent NO. 6,682,993.

With regard to the arguments about claim objections on page 10, the claim objections have been withdrawn, since it is now clear to the examiner that the special fourth dopent region is same as a special diffusion region.

With regard to the arguments about 35 U.S.C. 102(b) on page 10, the 102(b) rejection has been withdrawn and a new ground of rejection 35 U.S.C. 103(a) has been added, since the applicant added the new limitation of "wherein said ESD protection. said device normal drain region." The Chen reference teaches that the ESD protection discharging means has a special diffusion region under and around said device normal drain region. Chen teaches that [Col. 5, lines 54-58] p+ pockets 40 can be formed under any (n+) island. Fig. 6 depicts p+ pockets formed on the side of the n+ island. Combining the written description with the drawn description results in the p+ pocket material being under and around the n+ island.

With respect to the arguments about 35 U.S.C. 103(a) on page 11, the Chen reference teaches that the protection discharging means comprises a discharging NMOS device with a first and a second drain diffusion which extends under and around said first drain diffusion. Chen teaches that [Col. 5, lines 54-58] p+ pockets 40 can be formed under any (n+) island. Fig. 6 depicts p+

pockets formed on the side of the n+ island. Combining the written description with the drawn description results in the p+ pocket material being under and around the n+ island.

With respect to the arguments about claim 12 on page 12, the Chen reference teaches a special fourth dopent region of similar dopent to said substrate beneath one said second and third dopent region. Chen teaches that [Col. 5, lines 54-58] p+ pockets 40 can be formed under any (n+) island. Fig. 6 depicts p+ pockets formed on the side of the n+ island. Combining the written description with the drawn description results in the p+ pocket material being under and around the n+ island.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dharti H. Patel whose telephone number is 571-272-8659. The examiner can normally be reached on 8:30am - 5pm.

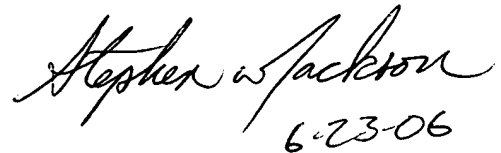
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2800, Ext. 36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through

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DHP
06/23/2006



Handwritten signature of Stephen W. Jackson, dated 6-23-06.

STEPHEN W. JACKSON
PRIMARY EXAMINER